

and the inflation rate by about 7 percentage points. The analysis assumed that neither price controls nor allocation policies would be implemented.

Virtually the entire impact of such a shortfall on GNP and unemployment, as well as a large part of the inflationary effect, could be averted by drawing on a reserve of about 750 million barrels. A reserve of 1 billion barrels could almost completely offset the effects of a year-long shortfall of 3 million barrels per day. In other terms, each barrel of SPR oil could avert about \$200 of potential GNP loss in the event of a year-long supply interruption in 1984. The 1 billion barrel reserve could also offset a complete cutoff of current levels of imported oil for almost six months. Studies have generally shown that drawing on a strategic reserve may be the most effective policy for reducing the adverse effects of an oil supply interruption.

PROGRAM STATUS AND OBSTACLES TO COMPLETION

The important benefits of a reserve notwithstanding, the SPR program has experienced serious difficulties and delays both in developing storage capacity and in obtaining oil. To date, storage capacity of only 250 million barrels has been completed, with another 150 million barrels slated for completion by 1985. In addition, while many of the technical difficulties in preparing storage have been solved, only 121 million barrels of reserve oil have been acquired to date. The Department of Energy (DOE) responded to the tight oil market resulting from the Iranian Revolution by suspending oil purchases in February 1979. SPR purchases were not resumed during the first half of 1980, although surplus oil was available. The Energy Security Act of 1980, signed into law in June 1980, directed DOE to resume oil purchases at a minimum average rate of 100,000 barrels per day.

Although DOE has begun acquiring oil again, and plans to purchase more than 200,000 barrels per day during fiscal year 1982, the 1 billion barrel reserve authorized by the Congress would take more than 12 years to complete at this rate. While higher rates of fill have been suggested, several factors constrain the Strategic Reserve buildup. Two major factors--budget and political constraints--are outlined here. If these obstacles are overcome, and the SPR program begins to acquire oil at higher levels, storage capacity limits may become a constraint.

Budgetary Impact of SPR Program. The costs of developing the SPR are high. Although the Congress authorized a reserve of 1 billion barrels, the Reagan Administration plans for one of 750,000 million barrels. There are now about 121 million barrels of oil in the reserve. Current Administration plans call for a fill rate of 200,000 barrels per day in fiscal year 1981

and 230,000 barrels per day in fiscal year 1982. This would create a reserve of 250 million barrels by the end of 1982. Implementing the latest Administration plan for filling the SPR, which averages approximately 195,000 barrels per day over the next seven years, would create a 750 million barrel reserve by the end of 1989. Filling the reserve under this schedule would require total additional budget authority for oil of \$36.7 billion in fiscal years 1981-1989, including the supplemental \$1.3 billion sought by the Administration for fiscal year 1981. In addition, \$0.1 billion would be required for administration and maintenance, and \$1.6 billion for the construction of salt dome storage facilities. Budget authority requirements fluctuate with the annual planned rate of fill, rising from \$4.4 billion in fiscal year 1982, to a peak of \$7.4 billion in fiscal year 1987. The total cost of a 750 million barrel reserve, including the amount appropriated to date, is estimated to be \$44.8 billion. 2/

Political Constraints. International considerations have also played a role in slowing the progress of the reserve program. Agreements with other members of the International Energy Agency (IEA) may limit the government purchases of oil for the reserve if tight markets ensue. Furthermore, producing nations have publicly opposed the program.

The IEA member countries agreed in 1979 to consult each other before continuing to stockpile oil. They also pledged that no country would resume stockpiling if such efforts would result in pressure on the oil market, although some member nations appear to have continued aggressive stockpiling programs. In a tight market, high rates of oil purchases for the SPR could result in increased prices not only for SPR oil but also for all consumers.

On the other hand, the world oil market does not generally react dramatically to oil trades of several hundred thousand barrels per day. Further, oil prices are not set solely by market conditions. Any price increases by producing nations resulting from SPR purchases might be politically motivated and, therefore, would be impossible to predict. Nevertheless, an aggressive U.S. reserve program might be opposed by consuming-nation allies.

While the producing nations generally oppose the reserve program, their response to renewed stockpiling is uncertain. Because the SPR is owned and managed by the federal government, however, foreign producers

2/ In addition, the federal government will collect and spend about \$0.5 billion in 1981 through the oil entitlements system which was in effect prior to decontrol of oil prices on January 28, 1981.

can apply political and economic pressure on government policy-makers. Saudi Arabia, for example, has been producing about 1.5 million barrels per day more than its stated preference. While this may be to reestablish Saudi Arabia's dominance in the Organization of Petroleum Exporting Countries (OPEC), there is little doubt that such overproduction has relieved the pressure on world oil prices. The possibility of production cutbacks, market instability, and price increases in response to aggressive federal efforts to fill the SPR cannot be ignored.

Storage Facility Limits. The current SPR storage capacity of about 250 million barrels--almost one-half of which is filled--consists of salt domes in Louisiana and Texas that have been mined to produce caverns for holding oil. Current construction plans call for a total capacity at these sites of 400 million barrels by 1985. If oil was acquired at a rate of 200,000 barrels per day, existing capacity would be filled before the end of 1982. Salt cavern construction is time consuming, so there is little hope for any significant increases in SPR salt dome capacity before 1985. SPR oil could be stored in above-ground storage tanks or in excess fleet tankers, but only at very high costs. Salt dome storage capacity currently costs only \$2 to \$3 per barrel, compared to \$12 to \$16 per barrel for above-ground steel tanks. Therefore, an aggressive oil acquisition program requiring other than salt dome storage may entail high storage costs.

FOREIGN EXPERIENCE

The obstacles facing the SPR program in the United States are not unique. Other consuming nations--Germany, Japan, France, and Italy, for example--are attempting to solve similar problems. While the governments, industries, and resources of these countries differ, their oil stockpiling programs provide some insight into how the United States could work toward its stockpiling goals. In addition to consuming nations' experience, some producers--most notably, Mexico--have issued oil-backed securities, and in doing so, have provided examples of an alternative method of financing the SPR. This section describes the experience of these foreign countries that is relevant to alternative programs for building and financing the SPR. 3/

3/ For more detailed information on international stockpiling programs, see E.N. Krapels, Oil Crisis Management (Baltimore: John Hopkins University Press, 1980); and D.A. Deese and J.S. Nye, Editors, Energy and Security (Cambridge: Ballinger Publishing Company, 1981).

Germany

In addition to storing about 40 million barrels of oil (20 days of net imports) in underground caverns in its Federal (Oil) Reserve, the Federal Republic of Germany established an oil storage corporation in 1978 to manage and finance a commercial strategic oil stockpile to which member firms must contribute. This corporation, the Erdolbevorratungsverband (EBV), holds the obligatory stocks of the member corporations, which include all of the German refining and oil importing firms. The EBV can take advantage of some economies of scale not available to all individual companies, thus reducing the total cost of storage to the industry and its consumers. The debt incurred for EBV oil acquisition is financed through the private capital market, and fees paid by the member companies cover operating costs.

The debt-financed EBV provides several attractive features. Not only does it equalize the costs of emergency oil storage across the industry (on a pro rata basis), but it removes these obligatory stocks from the balance sheets of private firms. The oil companies, therefore, no longer have to finance stockpiles through additional debt or retained earnings, but must pay annual fees to cover the interest on the EBV's debt. Further, while EBV oil is generally held by individual oil industry firms, the firms cannot, during an emergency, treat the oil as their own. Thus, no direct incentives to reduce their own private stocks are created.

To finance this operation, two German banking consortia made a 10-year agreement to provide a line of credit of 4 billion deutchemarks (about \$2 billion). The EBV can borrow against this, at the German prime rate, for periods of three months to 15 years. These loans are secured by (1) the oil and storage facilities; (2) the annual payments of the member companies; and (3) standard government services offered to German corporations under public law, including bankruptcy guarantees, legal limits on losses, and insurance of the oil inventory against liquidation. The EBV was financed entirely by debt, but is allowed to build equity by retaining earnings from any inventory sales resulting from changes in the obligatory level of stocks, and from upward rounding of the member's fees.

Japan

The traditionally close relationship between the Japanese government and industry enables the industry to maintain the National Petroleum Reserve. The Ministry of International Trade and Industry (MITI) exercises responsibility for energy regulation, including emergency authority. MITI apparently relies less on specific laws for such authority than on the strong

traditional relationship between government and industry. It "guided" Japanese oil companies toward holding a 60-day supply beginning in 1972. In 1975, MITI received approval to change the target to a 90-day supply. Although private stock levels have been running at closer to 100 days of supply, the 90-day level became mandatory in April 1981. 4/

The government removed part of the storage burden from the private oil companies by commissioning the now-called Japan National Oil Corporation to establish a government stockpile to supplement the privately held reserve. This stockpile, mostly stored in surplus tankers, held more than 30 million barrels (seven days of imports) in 1980. In addition, the government provides loans for new storage construction, loans and subsidies for oil purchases, a reduced fixed asset tax on storage facilities, and accelerated depreciation of storage facilities. These incentives, however, do not relieve the companies of carrying the cost of an excess inventory.

France and Italy

In 1928, the French government began to control the importing of crude oil and petroleum products. Through decrees in 1951, 1958, and 1975, importers and refiners have been required to maintain oil stockpiles equivalent to some percentage of their oil trade. The 1975 revision set the stockpile requirement at 25 percent of domestic sales of the preceeding 12 months. These stocks are held by the industry in decentralized locations and, unlike the German petroleum industry, must be carried on their books. Since the government in France controls gasoline and distillate fuel oil prices, however, a separate tax or fee to cover the additional expense is unnecessary since price ceilings allow for the additional costs. Thus, the impact of expenses for emergency stockpiles are passed on to consumers.

The Italian strategy is similar to that of France--the legal obligation to maintain the national emergency stock rests with the oil industry. Italy's storage regulations date back to 1933, with decrees in 1961 and 1976 establishing a storage target of 90 days of the previous calendar year's domestic sales. The burden of providing the stocks rests on both refiners and owners of storage facilities. All owners of storage facilities--any large-scale oil user--must maintain a minimum oil level of 20 percent of their tank capacity. Such a requirement appears unique to the Italian program.

4/ Petroleum Intelligence Weekly, March 2, 1981, p. 11.

One aspect of both the French and Italian programs is that, while the provisions to hold a percentage of a preceding period's sales may result in a higher average stock level, this requirement clearly does not provide a dedicated reserve. This may represent a broader problem. Since both programs commingle the emergency stockpiles with normal inventories, this may result in some reduction in conventional inventories and reduce the effectiveness of the emergency stockpiles.

Mexico

In 1977, Nacional Financiera, Inc. (NAFINSA)--the Mexican national financing corporation--offered its first issue of "petrobonos," certificates of common redeemable shares, backed by the proceeds of a crude oil sale contract with Petroleos Mexicanos (PEMEX). These petrobonds were issued to encourage savings, restore confidence in the Mexican banking system, and support Mexico's economic growth by attracting new sources of domestic capital. Further, it was hoped that the petrobond issues would help stem the capital outflow from the country--a problem that contributed to the devaluation of the peso.

The first petrobond offering, made in April 1977, consisted of three-year term common share certificates sold for a total value of 2 billion pesos (then equal to \$88 million). These certificates were backed by the sales value of 6.7 million barrels of oil. Certificates provided a minimum guaranteed annual rate of return of 7 percent, revisable and payable quarterly, and guaranteed by NAFINSA and the Mexican government. At maturity, three years from the date of issue, NAFINSA would collect the receipts from the crude oil sales contract by which the issue was backed. These receipts were to be calculated using the average PEMEX export price during the first 25 days of April 1980. The certificate holders would then be paid the face value of their securities, as well as their share of the increase in the value of the oil, less any interest payments that were paid quarterly during the life of the issue. The capital appreciation was to be calculated based on the price of oil in U.S. dollars, providing some additional protection against peso devaluation.

These bearer instruments were issued in denominations ranging from 1,000 pesos (then approximately \$44) to 1 million pesos (\$44,000). They were registered with the Mexican National Securities Commission and recorded in the Mexican Stock Exchange. Thus, they were relatively liquid through an active secondary market. In addition, a number of tax provisions generally favored the individual investor over institutional and professional investors.

Mexico offered the fifth issue in April 1980, a 5 billion peso (then approximately \$220 million) issue backed by 7.2 million barrels of oil. This most recent issue guarantees a minimum after-tax net return of 10 percent. It was offered to coincide with the retirement of the 1977 issue, which, because of large increases in the world price of oil during its term, resulted in an annual yield to investors of more than 33 percent. The offering was intended to attract new investors, and provide the first-issue certificate holders the opportunity to roll over their investment.

Table 1 presents data on the five petrobond offerings. It should be noted that the fifth offering, made in April 1980, was a rollover and reissuance of the first offering. Thus, the four offerings now outstanding total \$616 million (U.S.), and are backed by 26.8 million barrels of oil. While these revenues are far smaller than those required to fill the U.S. Strategic Reserve, the volume of petrobond holdings should be considered relative to the size of Mexican capital markets. This is an appropriate comparison,

TABLE 1. MEXICAN PETROBOND OFFERINGS, 1977-1980

Date of Offering	Value of Offering		Oil Committed to Offering (in millions of barrels)
	(in billions of pesos)	(in millions of dollars)	
April 1977	2	88	6.6
April 1978	2	88	6.7
August 1979	2	88	3.9
November 1979	5	220	9.0
April 1980	<u>5</u>	<u>220</u>	<u>7.2</u>
Total	16	704	33.4
Total Now Outstanding <u>a/</u>	14	616	26.8

SOURCE: Nacional Financiera, Inc., Washington, D.C.

a/ The first issue, dated April 1977, matured in April 1980, and was reissued. Thus, the April 1977 issue is not now outstanding.

insofar as the purchasers of petrobonds have been predominantly Mexican, and the volume of barrels sold has been constrained by the size of the Mexican economy. In 1979, Diemex-Wharton projected 1980 Mexican gross fixed investment of \$29.5 billion. ^{5/} Thus, petrobonds equalled approximately 2 percent of gross fixed investment, by value. A comparable commitment to petrobonds in the United States, if measured against U.S. gross fixed investment of \$415 billion, would total \$8.3 billion. Fixed investment is used solely as a rough proxy for the size of the U.S. and Mexican capital markets. In fact, the use of this proxy underestimates the size of the U.S. capital market, since U.S. markets are far more diverse than their Mexican counterparts.

United Kingdom

In October 1980, the British Department of Energy announced the government's intention to issue revenue bonds "linked to the fortunes of the British National Oil Company's (BNOC) North Sea Fields." ^{6/} The return on this new form of savings bond would be related to revenues from specific BNOC fields. Rather than paying a periodic dividend, the government would allow the income to accumulate, presumably increasing the value of the bond over time. The government would then be committed to redeem the bonds at their accumulated value, upon bearer demand. While no further details have been released, the announcement indicates that widespread ownership would be encouraged, particularly among small savers.

^{5/} Wharton Econometric Forecasting Associates, "Diemex-Wharton Modelo Econometrico de Mexico," January 27, 1979.

^{6/} British Department of Energy, Press Notice, October 9, 1980, Reference No. 206.

CHAPTER III. EVALUATION OF SPR FINANCING OPTIONS

The stockpiling programs and oil-backed securities employed by several other countries, as discussed in Chapter II, offer relevant strategies that can be useful in developing optional financing methods for the U.S. Strategic Petroleum Reserve (SPR). Four options that could be considered alternatives or supplements to the current program are first described and then evaluated in this chapter.

ALTERNATIVE FINANCING OPTIONS

The four options analyzed here are as follows:

- o Public capitalization of the SPR;
- o Debt financing of the SPR;
- o Development of an Industrial Petroleum Reserve (IPR); and
- o Mandating firms to contribute oil to the SPR.

Public Capitalization of the SPR through SPR Certificates

Given the likelihood that the price of oil will rise in real terms over the next decade, oil emerges as a potential appreciating speculative asset. ^{1/} Private futures trading markets have already been formed for several petroleum products, although a crude oil futures market may be difficult to organize, because of the wide variety of crude oil types and the absence of stable "quality differentials" in crude oil pricing. Nevertheless, the impetus for speculative acquisition of crude oil remains strong. ^{2/} This

^{1/} Prospects for oil price increases are discussed in detail in Congressional Budget Office, The World Oil Market in the 1980s: Implications for the United States (May 1980).

^{2/} A proposal for a general petroleum futures market can be found in Arnold Safer, International Oil Policy (Lexington, Massachusetts: Heath, 1979). Safer calls for use of the SPR facilities as a storage for futures market oil, but does not discuss filling a federal strategic reserve per se.

is particularly true given the high probability of future supply interruptions, which could be accompanied by sharp price increases. This potential demand could be harnessed by allowing individuals to hold title to the value of oil in the Strategic Reserve on a speculative basis, without rights to physical delivery.

Such a system could work as follows. The federal entity administering the SPR would issue "certificates" that conveyed a title to the value of a specified quantity of oil stored in the reserve. The oil itself would be held and controlled by the federal government. The certificates initially would be offered at a price based on the acquisition cost of the average SPR barrel, plus a fee equal to the pro rata costs of transportation and administration.^{3/} The securities market would then determine how many of these certificates would be sold. This amount might fall short of the volume needed to fill the SPR. Alternatively, a fixed number of certificates could be auctioned, however, without any guarantee that sufficient funds would be collected to buy all of the oil required. If either plan had insufficient demand, the government would become the buyer of last resort.

The certificates would be transferable, allowing holders to sell them to any buyer, thus developing a secondary market for trading the certificates. Upon a decision to draw upon the reserve, the government would buy back the reserve from certificate holders, prorating its purchases from all holders if only part of the reserve was to be depleted. Other options to facilitate emergency redemptions include issuing certificates that could be called in, or establishing queuing plans. At the time of redemption, the SPR certificate holders would be compensated at a price determined by some prespecified method for valuing SPR oil. This could not only provide an attractive return to private investors, but could also assure funds to certificate holders who need to buy oil at high prices. No private interest would take delivery of SPR oil until it was depleted at the discretion of the President, and recipients of the oil--oil firms or refiners, for example--would not necessarily be related to the list of title holders.

Debt Financing of the SPR through SPR Bonds

The government could finance the reserve by creating a debt issue (SPR bond). Such a SPR bond could be assigned a market rate of interest

^{3/} See Congressional Budget Office, An Evaluation of the Strategic Petroleum Reserve (June 1980). Storage costs, having been expended, are not included in the SPR certificate fee. Inclusion of these storage costs would raise the fee from \$2 to \$3 per barrel.

(such as the Treasury bill interest rate), or could be given a rate of interest based on the appreciation in the world price of oil. The difference between these two rates of return reflects a difference in who assumes the risk regarding the likely differential between the rate of appreciation of the price of oil and the Treasury bill interest rate.

In the case of a SPR bond issue assigned the market interest rate, the government (or taxpayers) bears the risk. If the rate of oil price appreciation exceeded the interest rate, the government would be able to sell the SPR at market prices, receive revenues in excess of all remittances to SPR bond holders, and make a profit. If the interest rate exceeded the rate of appreciation of oil prices, remittances from SPR sales might not cover all interest charges, and a subsidy from general revenues might be required when the SPR was depleted. To the federal government, this SPR bond option is effectively equivalent to the current system of on-budget financing. This reflects the implicit interest cost of money spent on the SPR, which could otherwise be used for different programs or to retire outstanding federal debt.

Alternatively, SPR bonds could be given a return determined by the rate of oil price appreciation. In this case, the bonds would not have a fixed coupon rate, but the interest payment would be calculated at the end of some period, based on movements in certain oil price indicators. The structure of risk and reward under this arrangement would be the same as under the public capitalization plan--in both cases, the purchasers of either SPR certificates or SPR bonds assume the risk regarding the differential between the price of oil and the interest rate, and receive the resulting return. Unlike the SPR certificate plan, however, the government would be committed to a periodic interest payment to SPR bondholders.

Such bonds would likely have a fixed term. Short terms, from three to five years, for example, would require frequent rollovers, but might help establish an active market. Not only might an active market help attract a wide range of investor interest, but current market conditions might also favor the shorter term. An oil-based security with a 10 to 15 year maturity, on the other hand, might be viewed by many investors as a legitimate long-term inflation hedge. Such an instrument, however, if perceived as more attractive than other long-term securities, might frustrate the efforts of other borrowers, including the U.S. Treasury, to lengthen the maturity of their debt.

Development of an Industrial Petroleum Reserve

The Energy Policy and Conservation Act (EPCA) gives the Secretary of Energy the discretionary authority to require that all petroleum refiners

and importers store up to 3 percent of the oil passing through their facilities annually as an Industrial Petroleum Reserve (IPR). The IPR could be developed using one of several methods:

- o The IPR could be developed by "decree," requiring that each firm be in compliance by a given date, as provided by EPCA;
- o Incentives or subsidies could be provided to firms to induce them to store the required amounts; and
- o Firms (by and large, refiners) could be allowed to purchase "titles" to oil owned and stored by individuals on a speculative basis, as "evidence" of meeting their IPR obligations. 4/

Under the decree plan, firms would be instructed to develop their individual reserves. Such a plan could pose several difficulties. Firms vary in their ability to finance the purchases of oil to be stored and not used until the IPR was depleted. Moreover, inspecting individual firms' storage for compliance would require a large amount of administrative overhead. Some firms might manipulate inventories to assure sufficiency for inspection purposes, or count as inventories tank and pipeline "bottoms" (oil that is used to maintain the continued operation of tanks and pipelines, but cannot be processed and marketed like conventional inventories). Given these equity and administrative problems, a decree approach might be difficult to implement.

An alternative to the decree plan could be constructed through a series of tax credits, grants, or loan guarantees that would induce firms to hold the required level of inventories. Certainly, some set of incentives could be devised that would result in any desired level of inventories. It is difficult to estimate precisely what these incentives would have to be, although they would probably have a serious effect on the federal budget.

The IPR evidence plan would require that all firms responsible for the development of an IPR "provide evidence" of sufficient storage. Such storage could be achieved by the firm contracting with a storage company to hold the reserve oil (a role that could be filled by the firm itself), and allowing the general public to purchase oil on a speculative basis for fixed periods. Should the IPR be depleted, the oil owners would sell their oil either openly on the market, to a government-specified user, or to the firm

4/ One such proposal was recently made by H. R. Leuba, A Free Enterprise Oil Storage Corporation (Chevy Chase, Maryland: Jack Faucett Associates, July 1980).

for which the oil was stored. In this sense, this option resembles the public capitalization of the SPR: private individuals would buy titles to reserve oil, but, under this arrangement, the oil would be held by storage companies, not the government. The investors might be allowed the option of withdrawing their oil after each year's storage. Such an arrangement, if successful, would minimize the financial burden placed on firms that would occur under a decreed IPR.

Mandating Contributions to the SPR

Rather than mandating firms to increase their own industrial stock-piles, the SPR could be filled by requiring oil industry firms--importers, refiners, and/or producers--to supply specified quantities of oil directly to federal storage facilities. Such a requirement would necessitate new legislation.

The costs of the SPR contributions could be imposed on the firms, to the extent that they were unable to pass them onto consumers. Alternatively, the federal government could subsidize this cost, for example, by paying the contributors the cost of financing the oil they were required to contribute. Or the government could guarantee that contributors, in the event of a reserve drawdown, would receive either a quantity of oil equal to their contribution or payment for the value of the oil. Guaranteeing a payment equal to the market value of the oil would be similar to issuing equity certificates, as in the public capitalization plan, but with the added factor of mandatory participation by oil industry firms.

EVALUATING SPR OPTIONS

No matter how the reserve is financed, there is an inescapable resource cost to society as a whole in accumulating and holding the reserve. Resources that could be used for current consumption or investment are being set aside--in the form of oil--for future use. When the reserve is used, society as a whole benefits since the SPR oil can mitigate the adverse economic effects of an oil supply interruption.

The four alternative ways of financing this resource cost--of dividing it between taxpayers and private investors or firms--can be evaluated by five criteria. The most important, the distribution of resource costs and risks, is discussed first. The other four criteria--degree of federal control, budgetary effects, speed and level of oil acquisition, and producer nation response--are discussed separately later in this section.

Distribution of Resource Benefits, Costs, and Risks

The most important of these criteria concerns the distribution of the economic benefits, costs, and risks resulting from the creation and depletion of the SPR. As discussed in Chapter II, the SPR has the potential to abate significant increases in unemployment and inflation and to reduce GNP losses, all of which occur during a disruption of foreign oil supplies. The benefits of the SPR, therefore, would accrue to the economy as a whole, in the manner that society benefits from growth in GNP and employment and lower inflation. Households would benefit from increased employment and higher incomes and from the mitigation of inflation (when compared to the economic effects of a disruption in oil imports without the SPR). Firms would benefit from higher profit levels, since the SPR would help maintain the pace of economic activity, and lessen the increase in energy input costs. Finally, a benefit would accrue to whoever "owns" the SPR, in the form of the receipts from SPR oil when it is depleted. This benefit, however, is uncertain and is associated with the financing method selected.

The economic benefits are obtained at the cost of creating the SPR. These costs may be shifted among different groups, depending on the method chosen to finance SPR purchases, but are roughly the same in the aggregate. Creation of the SPR requires that the economy defer some other economic activity--be it consumption, investment, or alternate federal spending--so that enough resources can be allocated to building a reserve. Different financing options do, however, affect the total cost of the SPR. Marketing special securities to finance the SPR would require some administrative overhead. Treasury debt financing provides the lowest expected cost financing available for the SPR, because it conveys the lowest level of risk associated with any mode of financing. Yet the bulk of SPR creation costs are inescapable.

The method chosen to finance the reserve, however, will determine who bears these inescapable costs. Under the current arrangement, in which SPR costs are appropriated from general revenues, the costs are borne by taxpayers. Financing methods that employ private individuals' speculative demand for oil would shift the costs of the SPR from either taxpayers or consumers and firms to those individuals willing to assume the risk associated with the price of oil. This type of arrangement, therefore, would allow private individuals to bear some of the inescapable costs of SPR completion that would otherwise be borne by taxpayers, consumers, or firms, in exchange for the opportunity to speculate on the price of oil. Thus, private financing of the SPR becomes an arrangement under which taxpayers allow those willing private investors to bear the risk that oil prices might not rise as quickly as the rate of interest, so that the economy as a whole can benefit from the existence of the SPR.

Decreeing that firms must hold dedicated IPR inventories, above the level they would choose to hold in an unregulated market, or mandating contributions to the SPR would force firms to bear the costs of acquisition and, in the case of decreed inventories, storage, for those inventories. Some of these costs would be passed onto consumers through price increases. However, the ability of firms to acquire and store IPR oil varies, as does their ability to pass these costs onto consumers. Thus, under such a decree or mandate, the costs of SPR development would be borne by consumers and by firms. Those costs borne by firms, however, would be disproportionately assigned to those firms that are unable to acquire and store IPR oil as efficiently as their competitors, or that lack the market power to pass IPR costs onto consumers.

These costs might be partly or fully repaid by the revenues realized upon the sale of reserve oil. If taxpayers finance the SPR, then the government would realize these revenues, and if the price of oil rises at a rate faster than the rate of interest, then no economic cost would be involved. There would be a transfer, however, from the group of current taxpayers to future ones. If firms hold IPR oil at government decree or make mandated contributions to the SPR, however, then those groups that actually bore the cost of developing the IPR (consumers and less efficient or smaller firms) might not realize the revenues resulting from its depletion.

Other Criteria

The financing options can also be measured against four other criteria:

- o Degree of Federal Control. To the extent that the SPR remains in the hands of the federal government, the option should preserve an appropriate level of federal control over reserve management, including depletion.
- o Budgetary Effects. The option should have a predictable effect on the federal budget, and should finance the SPR as efficiently as possible.
- o Speed and Level of Acquisition. The option should provide for SPR completion as rapidly as necessary.
- o Response of Producer Nations. The response of producer nations who are opposed to the acquisition of SPR oil must be assayed.

Degree of Federal Control

Another evaluative criteria for SPR funding options is the extent to which the federal government can exercise control over SPR management, including the degree of flexibility afforded the President in determining when the SPR will be depleted, how it will be allocated among refiners, and the regions and economic sectors to which it will be sent. The current SPR program--in which oil is purchased through direct federal expenditures and the President maintains drawdown authority--allows maximum federal control. This control can be exercised directly by allocating the reserve oil during a disruption. Alternatively, the control can be turned over to the private sector, by federal auctioning of the oil and allowing the market to allocate it. Both the public capitalization and debt financing proposals for SPR funding would also preserve maximum federal control over the SPR.

A more decentralized option, such as the IPR, might be preferable to the SPR in some situations, and, in general, might be an appropriate supplement to a federally controlled SPR. During small disruptions that are viewed as short term, for example, IPR options might offer more flexibility than the SPR, and the problems associated with reselling unneeded individual IPR reserves might be perceived as less severe. IPR proposals, however, would shift some control to the private sector participants.

Public Capitalization. Since public capitalization of the SPR would allow the SPR administration to deplete it (while providing for a market value transfer to SPR certificate holders from the government), no formal difficulties would exist in preserving total federal control. Moreover, possible pressure from SPR certificate holders to deplete (sell) the SPR when oil prices are highest would probably be diffused by holders' ability to sell their SPR certificates on the open market.

Debt Financing. Financing the SPR program with a targeted debt issue would change only the program's financial accounting. The federal government would likely continue controlling the storage construction, oil acquisition, and drawdown efforts. Thus, insofar as the federal government already controls the SPR program and has the power to sell bonds, debt financing of the SPR would result in little change in the government's ability to control the reserve.

IPR Options. Any of the options that would move some of the responsibility for physically storing oil to the private sector would necessarily transfer some degree of control away from the federal government. To the degree that the government relies heavily on the IPR, the loss of the control might pose problems. If, however, the IPR is considered a supplement to the federal SPR, the transfer of some control might allow a

greater range of responses to varying circumstances. Nevertheless, the use of an IPR raises several questions regarding the flexibility of the government to manage an oil interruption crisis in an equitable and efficient manner.

The pattern of shortages created by such a disruption would probably not match the across-the-board pattern of IPR inventories. Thus, some firms would be forced either to buy or to sell IPR oil among themselves. This reselling pattern raises the issue of what prices would accompany such transfers and, under the incentive arrangement, whether the government would be subsidizing a windfall to some firms.

In addition, no guarantee exists that reselling would occur in the proper amounts and directions. As a supply crisis continued and presumably deepened (following the pattern after the Iranian Revolution of 1979), prices would rise for a period of time. Thus, it is entirely possible that oil firms would receive authorization to exercise their control over IPR inventories. Those firms with large inventories could reimburse IPR oil holders (which could be the firms themselves), and then hoard or resell the inventories at a profit to firms suffering from shortfalls larger than their IPRs.

Under the circumstances just described, profiteering could occur at the expense of the IPR holders who transferred their oil to firms at a lower price under the evidence plan, or at the expense of taxpayers who subsidized the IPR's creation, should the incentive IPR plan be used. This raises the issues of what price firms would pay IPR holders for IPR oil should the government specify transactions, and whether investors would be willing to hold title to IPR oil under the evidence plan if private firm control were allowed. Some firms might be unwilling to sell or deplete their IPRs upon drawdown authorization, fearing a deepening supply crisis. This pattern was observed in 1979, as "force majeure" supply cutbacks from international major suppliers to third party buyers became common. The dispersion of the IPR, compared to the centralization of the SPR, might, therefore, make it difficult to assure equitable and efficient deliveries of reserves to refiners in need. For small disruptions, however, during which the federal government might be unwilling to draw down the SPR, an IPR could provide additional oil to help stabilize the oil market in the short run.

Mandated Contributions. Requiring firms to contribute oil to SPR facilities would allow the federal government to maintain physical control of the oil. But since the contributors would have a vested interest in the depletion of the SPR in addition to their active role in the oil market, they might attempt to pressure the SPR administrator to manage the reserve to their advantage. Also, such a plan would add oil only to the federal facilities, and not create a more decentralized emergency reserve as would

the other private IPR options. Further, it might be impossible both to mandate firms to contribute oil to the SPR and require them to develop an additional IPR. Thus, while much of the risk and burden of the reserve accumulation would be placed on oil industry firms, some of the advantages of IPRs--flexibility and efficiency during disruptions, for example--might be lost. On the other hand, requiring firms to store oil in SPR facilities would reduce the chance that firms would lower their own inventories, as they might under IPR options.

Budgetary Effects

Although storing oil for future use requires deferral of alternative economic activities, in the aggregate, this resource cost does not depend heavily on the particular financing mechanism chosen. Nevertheless, each option affects the federal budget differently, with implications which are important in current policymaking.

Public capitalization, the IPR evidence plan, a decreed IPR, and mandated contributions to the SPR would all avoid federal expenditures for the SPR, to the extent they were successful in filling it. Debt financing would have a larger budgetary effect, since the interest cost would be, in effect, equal to that now implicitly incurred under the current SPR program. Providing federal incentives to private firms to develop IPRs (through grants and tax credits) would have a potentially larger, long-term budgetary impact than does the existing program. While the costs incurred under the existing program will likely be recaptured upon depletion or dissolution of the reserve, the federal costs for providing incentives would not be recovered.

Public Capitalization. To the extent that public capitalization is successful, and private speculative demand for oil meets the needs of the SPR, such a program would make no significant direct demands on the federal budget. It would, however, divert private capital to this public purpose. In fact, should strong perceptions of oil price increases exist, the SPR administration might be able to acquire an equity share of the reserve without cost, by auctioning off certificates at a price greater than SPR acquisition costs. If public demand for SPR certificates should fall short of the desired fill rate, however, an alternate system, presumably involving federal expenditures, would have to be implemented to fill the gap. Thus, the budgetary impact of the public capitalization plan is uncertain, ranging from a net transfer of funds to the government (through acquisition of an equity share) to the cost of acquisition and storage of that amount of oil that cannot be supplied through certificate purchases. Yet the SPR certificate plan would eliminate the need for any federal expenditure for